24

The Importation of
Belgian and Dutch Leeks, Romanian Garlic and Swiss Shallots
Into the United States

A Qualitative Pest Risk Assessment

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TABLE OF CONTENTS

A. Introduction 1

B. Risk Assessment

1. Initiating Event: Proposed Action 1

2. Assessment of Weediness Potential 1

3. Previous Risk Assessments, Current Status and Pest Interceptions 3

4. Pest List: Pests Associated with *Allium* in Europe 3

5. List of Quarantine Pests 9

6. Quarantine Pests Likely to Follow Pathway (Quarantine Pests Selected for Further Analysis) 10

7. Economic Importance: Consequences of Introduction 11

8. Likelihood of Introduction 13

9. Pest Risk Potential 14

10. Phytosanitary Measures. 16

C. Literature Cited 16

A. Introduction

This pest risk assessment (PRA) was conducted by the United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine (USDA, APHIS, PPQ) on three species of *Allium* from certain countries in Europe. The results are expressed qualitatively (high or low), rather than quantitatively (probabilities or frequencies). The risk assessment methodology can be found in: *Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments* (USDA, 1995), available from the Agency Contact identified on the front of this Assessment. Regulatory authority for plant pest/plant products is derived from the Plant Quarantine Act (1912), the Plant Pest Act (1957) and the Noxious Weed Act (1974). The methods/terminology used to initiate, conduct and report this PRA are consistent with guidelines provided by FAO (1995) and NAPPO (1995).

B. Risk Assessment

1. Initiating Event: Proposed Action

This commodity-based, pathway-initiated, PRA was conducted to assess the risks associated with garlic (*Allium sativum*) from Romania, leeks (*A. porrum*) from Belgium and The Netherlands and shallots (*A. cepa*) from Switzerland. The regulating authority for fruit and vegetable importation is 7 CFR 319.56.

2. Assessment of Weediness Potential of *Allium* spp.

Table 1: Process for Determining Weediness Potential of Commodity
Commodities: *Allium cepa* (onion/shallot), *A. porrum* (leek; = *A. ampeloprasum* var. *porrum* (L) Gay) and *A. sativum L.* (garlic). Phase 1: *Allium cepa, A. porrum* and *A. sativum* are widely cultivated in the United States. Phase 2: Is the species listed in: *<u>YES</u> *Geographical Atlas of World Weeds* (Holm, *et al* 1979) <u>NO</u> *World's Worst Weeds* (Holm, *et al* 1977) <u>NO</u> Report of the Technical Committee to Evaluate Noxious Weeds; Exotic Weeds for Federal Noxious Weed Act (Gunn and Ritchie, 1982)

NO *Economically Important Foreign Weeds* (Reed, 1977)

NO Weed Science Society of America list (WSSA, 1989)

NO Is there any literature reference indicating weediness (*e.g.* , *AGRICOLA* , *CAB* , *Biological Abstracts* , *AGRIS* ; search on "species name" combined with "weed").

Phase 3: Conclusion: *Holm, *et al* (1979) listed *A. cepa* as a common weed in Yugoslavia, and *A. ampeloprasum* as a common weed in Iran, Portugal and a weed of unknown importance in Turkey. Holm, *et al* (1979) listed *A. sativum* as a weed of unknown importance in Jamaica. However, these plant species are widely grown in the United States and do not pose significant risks as weeds.

3. Previous Risk Assessments, Current Status and Pest Interceptions

Decision History for *Allium* spp. from Europe

1992 - Refuse entry of *Allium porrum* (above ground parts) from Belgium.

1988 - Refuse entry of *Allium sativum* (above ground parts) from Italy.

1988 - Refuse entry of *Allium sativum* (above ground parts) from Spain.

1988 - Refuse entry of *Allium schoenoprasum* from the Netherlands.

1963 - Permit entry, without tops of *Allium cepa* and *A. sativum* from the Netherlands.

1924 - Permit entry of *Allium cepa* , from Belgium, into northern ports.

1924 - Permit entry of *Allium cepa* , from the Netherlands, into northern ports

Pest Interceptions on *Allium* from Europe - FY 85-95

PEST ORIGIN HOST

DIPTERA

Agromyzidae, species of Netherlands Allium ampeloprasum (Leaf)

Agromyzidae, species of Netherlands Allium sp. (Flower)

HETEROPTERA

Miridae, species of Netherlands Allium sp. (Flower)

HOMOPTERA

Aphididae

Aphididae, species of Netherlands Allium sp. (Flower)

Macrosiphum sp. Netherlands Allium sp. (Flower)

LEPIDOPTERA

Acrolopiidae

Acrolepiopsis assectella Europe (Country) Allium porrum (Leaf)

Acrolepiopsis assectella Netherlands(?) Allium sp. (Leaf)

Acrolepiopsis assectella Netherlands Allium ampeloprasum (Leaf)

Acrolepiopsis assectella Netherlands Allium ampeloprasum (Stem)

Acrolepiopsis assectella Netherlands Allium sp.

Acrolepiopsis sp. Netherlands Allium sp. (Flower)

Cossidae

Dyspessa ulula Netherlands Allium sativum (Bulb)

Geometridae

Geometridae, species of Netherlands Allium sp. (Flower)

Noctuidae

Noctuidae, species of Netherlands(?) Allium sp. (Flower)

Noctuidae, species of Netherlands Allium sp. (Flower)

Noctuidae, species of Netherlands Allium sp. (Leaf)

Noctuidae, species of Netherlands Allium sp.

Helicoverpa armigera Netherlands Allium sp.

Helicoverpa sp. Netherlands(?) Allium sp. (Flower)

Helicoverpa sp. Netherlands Allium sp. (Flower)

Helicoverpa sp. Netherlands Allium sp. (Stem)

Heliothis sp. Netherlands(?) Allium sp. (Flower)

Heliothis sp. Netherlands(?) Allium sp. (Stem)

Heliothis sp. Netherlands Allium sp. (Flower)

Tortricidae

Tortricidae, species of Netherlands Allium sp. (Flower)

Tortricinae, species of Netherlands Allium sp. (Flower)

THYSANOPTERA

Thripidae

Thripidae, species of Netherlands Allium sp. (Flower)

Frankliniella intonsa Netherlands Allium sp. (Flower)

Frankliniella schultzei Netherlands Allium sp.

Melanthrips gracilicornis Netherlands Allium sp. (Flower)

Thrips sp. Netherlands Allium sp. (Flower)

Thrips major Netherlands Allium sp. (Flower)

Thrips palmi Netherlands(?) Allium sp. (Flower)

Thrips palmi Netherlands Allium sp. (Flower)

GASTROPODA

Pulmonata

Monacha sp. Netherlands Allium sp. (Flower)

FUNGI

Hyphomycetes

Circinotrichum poonense Netherlands Allium ampeloprasum (Leaf)

4. Pest List: Pests Associated with *Allium* spp. In Europe.

Table 2: Pests Associated with *Allium* spp.

INSECTA

Pest	Distribution^1	Code^2	References
Acrolepiopsis sp. (Lepidoptera: Acrolepiidae)	NE	z_i	PPQ Interception
Acrolepiopsis assectella (Zeller) (Lepdioptera: Acrolepiidae)	EU	z_i	Carter, 1984; CIE, Map No. 405, 1980; Hill, 1987; PPQ Interception
Agriotes lineatus L. (Coleoptera: Elateridae)	EU	e	EPPO Database; Hill, 1987; PNKTO No. 5.
Agromyzidae sp. (Diptera: Agromyzidae)	NE	z_i	PPQ Interception
Agrotis segetum (Denis & Schiffermuller) (Lepidoptera: Noctuidae)	EU	e	CIE, Map No. 490, 1987; Hill, 1987; Zhang, 1994
Aphididae sp. (Homoptera: Aphididae)	NE	z_e	PPQ Interception
Autographa gamma (L) (Lepidoptera: Noctuidae)	NE, RO, SW	e	PNKTO No. 75.
Brachycerus algirus (F.) (Coleoptera: Curculionidae)	RO	e	EPPO Database
Caliothrips indicus (Bag.) (Thysanoptera: Thripdae)	EU	e	Hill, 1987
Chromatomyia horticola (Goureau) (Diptera: Agromyzidae)	EU	z_i	Spencer, 1973, 1990
Cnephasia spp. (Lepidoptera: Tortricidae)	EU	e	Hill, 1987
Delia antiqua (Meigen) (Diptera: Anthomyiidae)	cosmopolitan	c	EPPO Database; Hill, 1987
Delia hirticrura (Fons.)	Mediterranean	e	EPPO Database; Abul-Nasr,

(Diptera: Anthomyiidae)	area		1974; El-Kifl, *et al.* , 1975
Delia platura (Meigen) (Diptera: Anthomyiidae)	cosmopolitan	c	EPPO Database; Hill, 1987
Dyspessa ulula (Borkhausen) (Lepdioptera: Cossidae)	C., E. & S. EU	z_i	Carter, 1984; PPQ Interception; Zhang, 1994
Frankliniella intonsa (Trybom) (Thysanoptera: Thripidae)	NE	z_e	PPQ Interception
Frankliniella occidentalis Pergande (Thysanoptera: Thripidae)	BE, NE, SW, US	c	Smith *et al.* , 1992
Frankliniella schultzei (Trybom) (Thysanoptera: Thripidae)	NE	z_e	PPQ Interception
Geometridae sp. (Lepidoptera: Geometridae)	NE	z_e	PPQ Interception
Helicoverpa sp. (Lepidoptera: Noctuidae)	NE	z_e	PPQ Interception
Helicoverpa armigera (Hubner) (Lepidoptera: Noctuidae)	C. & S. EU	e	Zhang, 1994
Heliothis sp. (Lepidoptera: Noctuidae)	NE	z_e	PPQ Interception
Lipaphis erysimi (Kaltenbach) (Homoptera: Aphididae)	cosmopolitan	c	Blackman and Eastop, 1984; Hill, 1987
Liriomyzia cepae Hering (Diptera: Agromyzidae)	W. EU, NE	z_i	van Frankenhuyzen, 1977; Spencer, 1973, 1990
Liriomyza huidobrensis (Blanchard) (Diptera: Agromyzidae)	BE, CA, HI, NE	z_i	Smith *et al.* , 1992; Spencer, 1973
Liriomyza nietzkei Spencer (Diptera: Agromyzidae)	BE?, SW	z_i	Freuler, *et al* .,1980; Martinez, 1982; Spencer, 1973, 1990; Suss, 1974
Liriomyza trifolii (Burgess)	NE, RO, SW, US	c	Hill, 1987; Spencer, 1990;

(Diptera: Agromyzidae)			Smith *et al.* , 1992
Macrosiphum sp. (Homoptera: Aphididae)	NE	z_e	PPQ Interception
Mamestra brassicae (L.) (Lepidoptera: Noctuidae)	EU	z_e, z_i	Hill, 1987; PNKTO No. 74; Zhang, 1994
Melanthrips gracilicornis Maltbaek (Thysanoptera: Thripidae)	NE	z_e	PPQ Interception
Melolontha melolontha (L.) (Coleoptera: Scarabaeidae)	BE	e	CIE, Map No. 193, 1965; Hill, 1987; INKTO No. 1
Miridae sp. (Heteroptera: Miridae)	NE	z_e	PPQ Interception
Mythimna unipuncta (Haworth) (Lepidoptera: Noctuidae)	S. EU, US(OR)	z_e	Hill, 1987; Zhang,1994
Myzus ascalonicus (Don.) (Homoptera: Aphididae)	EU, US	c	Blackman and Eastop, 1984; Hill, 1987
Myzus persicae (Sulzer) (Homoptera: Aphididae)	cosmopolitan	c	Blackman and Eastop, 1984; Hill, 1987
Noctua pronuba (L.) (Lepidoptera: Noctuidae)	EU, NE U.S.	e	Hill, 1987; USDA NAPIS Database
Noctuidae sp. (Lepidoptera: Noctuidae)	NE	z_e	PPQ Interception
Pieris brassicae (L.) (Lepidoptera: Pieridae)	BE, NE, RO, SW	e	FAO Database; PNKTO No. 47.
Spodoptera exigua (Hubner) (Lepidoptera: Noctuidae)	Mediterranean area, S. EU, US (AR, CA)	c	Hill, 1987; Zhang, 1994
Spodoptera littoralis (Boisduval) (Lepidoptera: Noctuidae)	C. & S. EU, Mediterranean area	e	Hill, 1987; Zhang, 1994
Thripidae sp.	NE	z_e	PPQ Interception

(Thysanoptera: Thripidae			
Thrips sp. (Thysanoptera: Thripidae)	NE	z_e	PPQ Interception
Thrips angusticeps Uzel (Thysanoptera: Thripidae)	EU	e	Hill, 1987
Thrips major Uzel (Thysanoptera: Thripidae)	NE	z_e	PPQ Interception
Thrips palmi Karny (Thysanoptera: Thripidae)	NE, US(FL, HI)	z_e	PPQ Interception
Thrips tabaci Lindemann (Thysanoptera: Thripidae)	EU, US	c	Hill, 1987
Tortricidae sp. (Lepidoptera: Tortricidae)	NE	z_e	PPQ Interception
ACARINA			
Aceria tulipae (Eriophyidae)	cosmopolitan	c	Hill, 1987
Rhyzoglyphus spp. (Acaridae)	cosmopolitan	c	Hill, 1987
GASTROPODA			
Monacha sp.	NE	z_e	PPQ Intereception
NEMATODA			
Aphelenchoides fragariae (Ritzema Bos) Christie (Aphelenchoididae)	BE, SW, US	c	FAO Database, 1994; French, 1989; Havens, 1986; Maas, 1984
Ditylenchus destructor Thorne (Anguinidae)	BE, NE, RO, SW, US	c	Havens, 1986; EPPO, 1978; Smith *et al*., 1992
Ditylenchus dipsaci Kuhn (Anguinidae)	BE, NE, RO, SW, US	c	Havens, 1986; Smith *et al*., 1992; Vallotton 1981; Cindea, 1980; Kaai and Koert, 1971
PATHOGENS			

Alternaria porri (Ellis) Cif. (Fungi Imperfecti: Hyphomycetes)	NE, RO, US	c	CMI 1985,Map 350; Farr *et al.* , 1989; Schepers and Meier, 1992; Schwartz andMohan, 1995
Botrytis aclada Fresen. (Syn - *B. alii* Munn.) (Fungi Imperfecti: Hyphomycetes)	NE, US	c	Farr *et al.,* 1989; Kohl et al. 1991; Krijthe, 1973
Botrytis cinerea Pers.:Fr. (Fungi Imperfecti: Hyphomycetes)	NE, US	c	Kohl et al., 1995; Farr *et al.,* , 1989
Botryotinia porri (van Beyma Thoe Kingma) Whetzel (Anamorph - *Botrytis porri* Buchw.) (Ascomycetes: Discomycetes)	EU	c	FAO Database,1994; Schwartz and Mohan, 1995
Botryotinia squamosa Vein.-Bourg. (Anamorph: *Botrytis squamosa* J. C. Walker) (Ascomycetes: Discomycetes)	BE, NE, US	c	CMI 1977, Map 164; FAO 1994; Farr *et al.,* , 1989, Schwartz and Mohan, 1995;
Circinotrichum poonense Pirozynski (Fungi Imperfecti: Hyphomycetes)	NE	b, k, n	PPQ Interception; Ellis, 1971
Cladosporium allii (Ellis & G. Martin) P. M. Kirk & J. G. Gompton (Fungi Imperfecti: Hyphomycetes)	SW, US	c	Farr, *et al* ., 1989; Neury and Corbaz, 1990
Embellisia allii (Campanile) E. Simmons (Syn.: *Helminthosporium allii* Campanile) (Fungi Imperfecti: Hyphomycetes)	RO, US	c	Farr *et al.,* 1989; CSIOS, 1987
Erwinia chrysanthemi Burkholder, McFadden & Dimock	NE, RO, US	c	CMI 1977, #553; EPPO Data Sheet, 1980; Havens, 1986; Smith *et al* ., 1992
Fusarium culmorum (Wm. G. Sm.) Sacc (Fungi Imperfecti: Hyphomycetes)	BE, NE, RO, SW, US	c	CMI 1984, Map 440; Farr *et al.,* , 1989; Govt. Agric. Res. Ctr., 1975; Roelands and Alofs, 1979;
Leek chlorotic streak virus	BE, NE	z_e, z_i	Verhoyen, 1973; Backus and Kleuskens, 1975; Bos *et al* ., 1978a; Van Dijk, 1993
Leptotrochila porri (Ascomycetes: Discomycetes)	NE	z_e, z_i	Heymans and Liekens, 1972
Melampsora allii-fragilis Kleb. (Basidiomycetes: Uredinales)	RO	z_e, z_i	Watson, 1971
Melampsora allii-salicis albae Kleb. (Basidiomycetes: Uredinales)	BE	z_e, z_i	Watson, 1971

Melampsora allii-populina Kleb. (Basidiomycetes: Uredinales)	BE, SW	z_e, z_i	Watson, 1971
Mycosphaerella schoenprasi (Rab.) Wint. (Ascomycetes:Loculoascomycetes)	EU	z_e, z_i	Watson, 1971
Onion yellow dwarf potyvirus	NE, RO, SW, US	c	CMI 1986, Map 46; FAO Database 1994; Van Dijk, 1993
Peronospora destructor (Berk.) Casp. in Berk. (Oomycetes: Peronosporales)	RO, SW, US	c	CMI 1975, #456; CMI 1990, Map 76 ; Farr *et al.* , 1989; Schwartz and Mohan, 1995
Phytophthora cactorum (Lebert & Cohn) J. Schrot.	BE, NE, SW, RO, US	c	Corbaz and Bolay, 1991; CMI 1984, Map 280; Farr *et al.* , 1989
Phytophthora porri Foister (Oomycetes: Peronosporales)	BE, NE, SW	z_e, z_i	CMI 1990, Map 204, CMI 1978,#595; FAO database, 1994; Watson, 1971; Vanparys, *et al* ., 1993
Pleospora herbarum (Pers.:Fr.) Rabenh. (Ascomycetes: Loculoascomycetes)	NE, US	c	Farr *et al.* , 1989; Instituut voor Plantenziektenkundig Onderzoek, 1972.
Puccinia allii F. Rudolphi (Syn.: *P. porri* G. Wint.) (Basidiomycetes: Uredinales)	BE, NE, RO, SW, US	c	CMI 1984, Map 400; CMI 1965,# 52; Farr *et al.* , 1989; Govt. Agric. Res. Ctr., 1975; Schwartz and Mohan, 1995; Vanparys, *et al* ., 1993
Rhabdospora aliicola (Baum)(Syn.: *Septoria alliicola*) (Fungi Imperfecti: Coelomycetes)	EU	K	Watson, 1971
Shallot latent virus	BE, NE	z_e, z_i	Bos, *et al* , 1978b; Verhoyen and Horvat, 1981
Sclerotium cepivorum Berk. (Fungi Imperfecti: Agonomycetes)	NE, RO, SW, US	c	CMI 1990, Map 331, CMI 1976,# 512; Farr *et al.* , 1989; Schwartz and Mohan, 1995
Septoria ranojevicii Bub.var. *allii-obliqua* Savul & Sandu (Fungi Imperfecti: Coelomycetes)	RO	K	Hunt and Lohr, 1944
Tomato black ring nepovirus	NE, RO	z_e, z_i	Smith *et al* ., 1992
Urocystis magica Pass in Theum.	BE, NE, RO, SW,	c	CMI 1984, Map 12; CMI

(Syn.: *U. cepulae* Frost) (Basidiomycetes: Ustilaginales)	US		1971,#298; Farr, *et al.* 1989; Schwartz and Mohan, 1995;
Uromyces ambiguus (DC.) Lev. (Basidiomycetes: Uredinales)	EU	z_e, z_i	Watson, 1971
Uromyces japonicus Berk. & Curt. (Basidiomycetes: Uredinales)	EU	z_e, z_i	Watson, 1971

[1] Distribution: AR - Arkansas; BE - Belgium; CA - California; EU - Europe; HI - Hawaii; NE - Netherlands; RO - Romania; SW - Switzerland; US - United States; NE U.S. - Northeastern United States

[2] Codes:

b - Not likely to be a primary plant pest.

c - Listed in non-reportable dictionary as non-actionable.

e - Although pest attacks commodity, it would not be expected to remain with the commodity (plant part) during processing

k - Not specifically listed for host, but reported from other hosts in same plant genus/family.

n - Listed in the USDA catalogue of intercepted pests as actionable.

z_i - Internal feeder: Pest is known to attack or infect commodity and it would be reasonable to expect the pest may remain with the commodity during processing and shipping.

z_e - External feeder: Pest is known to commonly attack or infect commodity and it would be reasonable to expect the pest may remain with the commodity during processing and shipping.

5. List of Quarantine Pests

Arthropods

Acrolepiopsis assectella (Zeller) (Lepdioptera: Acrolepiidae)

Agriotes lineatus L. (Coleoptera: Elateridae)

Agrotis segetum (Denis & Schiffermuller) (Lepidoptera: Noctuidae)

Autographa gamma (L) (Lepidoptera: Noctuidae)

Brachycerus algirus (F.) (Coleoptera: Curculionidae)

Caliothrips indicus (Bag.) (Thysanoptera:)

Chromatomyia horticola (Goureau) (Diptera: Agromyzidae)

Delia hirticrura (Fons.) (Diptera: Anthomyiidae)

Dyspessa ulula (Borkhausen) (Lepdioptera: Cossidae)

Frankliniella intonsa (Trybom) (Thysanoptera: Thripidae)

Frankliniella schultzei (Trybom) (Thysanoptera: Thripidae)

Helicoverpa armigera (Hubner) (Lepidoptera: Noctuidae)

Liriomyzia cepae Hering (Diptera: Agromyzidae)

Liriomyza huidobrensis (Blanchard) (Diptera: Agromyzidae)

Liriomyza nietzkei Spencer (Diptera: Agromyzidae)

Mamestra brassicae (L.) (Lepidoptera: Noctuidae)

Melanthrips gracilicornis Maltbaek (Thysanoptera: Aeolohripidae)

Melolontha melolontha (L.) (Coleoptera: Scarabaeidae)

Mythimna unipuncta (Haworth) (Lepidoptera: Noctuidae)

Noctua pronuba (L.) (Lepidoptera: Noctuidae)

Pieris brassicae (L.) (Lepidoptera: Pieridae)

Spodoptera littoralis (Boisduval) (Lepidoptera: Noctuidae)

Thrips angusticeps Uzel (Thysanoptera: Thripidae)

Thrips major Uzel (Thysanoptera: Thripidae)

Thrips palmi Karny (Thysanoptera: Thripidae)

Plant Pathogens

Circinotrichum poonense Pirozynski

Leek chlorotic streak virus

Leptotrochila porri

Melampsora allii-fragilis Kleb.

Melampsora allii-salicis albae Kleb.

Melampsora allii-populina Kleb.

Mycosphaerella schoenoprasi (Rab.) Wint.

Phytophthora porri Foister

Shallot latent virus

Tomato black ring nepovirus

Uromyces ambiguus (DC.) Lev.

Uromyces japonicus Berk. & Curt.

6. Quarantine Pests Selected For Further Analysis

Table 3: Quarantine Pests Selected For Further Analysis
Acrolepiopsis assectella (Zeller) (Lepdioptera: Acrolepiidae)
Chromatomyia horticola (Goureau) (Diptera: Agromyzidae)
Dyspessa ulula (Borkhausen) (Lepdioptera: Cossidae)
Liriomyzia cepae Hering (Diptera: Agromyzidae)
Liriomyza huidobrensis (Blanchard) (Diptera: Agromyzidae)
Liriomyza nietzkei Spencer (Diptera: Agromyzidae)
Leek chlorotic streak virus
Leptotrochila porri
Melampsora allii-salicis albae Kleb.
Melampsora allii-populina Kleb.
Mycosphaerella schoenoprasi (Rab.) Wint.
Phytophthora porri Foister
Shallot latent virus

Tomato black ring nepovirus

Uromyces ambiguus (DC.) Lev.

Uromyces japonicus Berk. & Curt.

Other organisms in this Assessment, not chosen for further scrutiny, may be potentially detrimental to the agricultural production systems of the United States. However, there were a variety of reasons for not subjecting them to further analysis: they are associated mainly with plant parts other than commodity; they may be associated with the commodity, however, it was not considered reasonable to expect these pests to remain with the commodity during processing; they have been intercepted, as biological contaminants, by PPQ Officers during inspections of these commodities and would not be expected to be found in every shipment.

7. Economic Importance: Consequences of Introduction

Pests rated for potential economic importance are evaluated against five biological factors (Risk Elements, Res)(USDA, 1995). The cumulative score for the REs is the Risk Rating. This Risk Rating is considered to be a biological indicator of the potential destructiveness of the rated pests.

Table 4: Risk Rating - Consequences of Introduction

Pest	Climate/ Host Interaction	Host Range	Dispersal Potential	Economic Impact	Environ-mental Impact	Risk Rating
Acrolepiopsis assectella	High	Low	Medium	Medium	Low	Medium
Chromatomyia horticola	High	High	Medium	Medium	Low	Medium
Dyspessa ulula	High	Low	Medium	Medium	Low	Medium
Liriomyza cepae	High	Low	Medium	Medium	Low	Medium
Liriomyza huidobrensis	High	High	Medium	Medium	Low	Medium
Liriomyza nietzkei	High	Low	Medium	Medium	Low	Medium
Leek chlorotic streak virus	High	Medium	Medium	Medium	Low	Medium
Leptotrochila porri	High	Low	Medium	Medium	Medium	Medium
Melampsora allii-salicis albae	High	Medium	Medium	Medium	Low	Medium
Melampsora allii-populina	High	Medium	Medium	Medium	Low	Medium
Mycosphaer-ella schoenoprasi	High	Medium	Medium	Medium	Low	Medium

Phytophthora porri	High	High	Medium	Medium	Medium	High
Shallot latent virus	High	Medium	Medium	Low	Low	Medium
Tomato black ring nepovirus	High	High	Medium	High	Medium	High
Uromyces ambiguus	High	Medium	Medium	Medium	Low	Medium
Uromyces japonicus	High	Medium	Medium	Medium	Low	Medium

8. Likelihood of Introduction

The likelihood of introduction for a pest is rated relative to six factors - The quantity of the commodity imported annually (RE 6) and the survival of the pests and their access to suitable habitats and hosts (RE 7)(USDA, 1995).

Table 5: Risk Rating - Likelihood of Introduction

Pest	Quantity of commodity imported annually	Likelihood survive postharvest treatment	Likelihood survive shipment	Likelihood not detected at port of entry	Likelihood moved to suitable habitat	Likelihood find suitable host
Acrolepiopsis assectella	Medium	High	High	Medium	Medium	Medium
Chromatomyia hotricola	Medium	High	High	Medium	Medium	Medium
Dyspessa ulula	Medium	High	High	Low	Medium	Medium
Liriomyza cepae	Medium	High	High	Medium	Medium	Medium
Liriomyza huidobrensis	Medium	High	High	Medium	Medium	Medium
Liriomyza nietzkei	Medium	High	High	Medium	Medium	Medium
Leek chlorotic streak virus	Medium	High	High	Medium	Medium	Medium
Leptotrochila porri	Medium	High	High	Medium	Medium	Medium
Melampsora allii-salicis	Medium	High	High	Medium	Medium	Medium
Melampsora allii-populina	Medium	High	High	Medium	Medium	Medium
Mycosphaer-ella schoenoprasi	Medium	High	High	Medium	Medium	Medium
Phytophthora porri	Medium	High	High	Medium	Medium	Medium
Shallot latent virus	Medium	High	High	High	Medium	Medium
Tomato black ring nepovirus	Medium	High	High	High	Medium	Medium
Uromyces ambiguus	Medium	High	High	Medium	Medium	Medium
Uromyces japonicus	Medium	High	High	Medium	Medium	Medium

9. Pest Risk Potential

The summation of the Consequences and Likelihood of Introductions (Tables 4 and 5) yields the Pest Risk Potential (PRP)(USDA, 1995). Pests rated with Low PRPs will (usually) require only Port of Entry inspection to maintain phytosanitary security. However, pests with Medium to High PRPs will typically require phytosanitary measures more stringent than those provided, solely, by Port of Entry inspections.

Table 5: Pest Risk Potential

Pest	Pest Risk Potential
Acrolepiopsis assectella	Medium
Chromatomyia hotricola	Medium
Dyspessa ulula	Medium
Liriomyza cepae	Medium
Liriomyza huidobrensis	Medium
Liriomyza nietzkei	Medium
Leek chlorotic streak virus	Medium
Leptotrochila porri	Medium
Melampsora allii-salicis albae	Medium
Melampsora allii-populina	Medium
Mycosphaer-ella schoenprasi	Medium
Phytophthora porri	Medium
Shallot latent virus	Medium
Tomato black ring neopvirus	High
Uromyces ambiguus	Medium
Uromyces japonicus	Medium

10. Phytosanitary Measures

As the pests rated in this Assessment received Medium PRPs, specific mitigation measures will be warranted. However, the choice of appropriate sanitary and phytosanitary measures to mitigate the risks associated with European species of *Allium* is undertaken as part of Risk Management, and is not addressed, *per se*, in this document. *Circinotrichum* species are listed as occurring on fallen leaves and dead twigs. For this reason, it may be necessary to specify the commodity be free of plant debris for importation purposes. *Melampsora allii-fragilis* is listed as associated with garlic leaves.

For this reason it may be necessary to specify the commodity be free of leaves. Additionally, should there be a change in the quarantine status of *Liriomyza huidobrensis* , this Risk Assessment will be amended to reflect that change.

C. LITERATURE CITED:

Abul-Nasr, S. E. And A. R. A. El-Sherif. 1974. Biological studies on the onion maggot, *Delia alliaria* (Diptera: Anthomyiidae). Bull. Soc. Entomol. Egypte 58: 375-79.

Backus, C. T. G., J. Kleuskens. 1975. Prei geelstreepvirus. Groenten en Fruit 30 (40): 1867.

Blackman, R. L. and V. F. Eastop. 1984. Aphids on the World's Crops: An Identification Guide. John Wiley & Sons, Chichester. 466pp.

Bos, L., N. Huijberts, H. Huttinga, D. Z. Maat. 1978a. Leek yellow stripe virus and its relationships to onion yellow dwarf virus; characterization, ecology and possible control. Netherlands J. Plant Pathol. 84 (5): 185-204.

Bos, L., H. Huttinga, D.Z. Maat. 1978b. Shallot latent virus, a new carlavirus. Netherlands J. Plant Pathol. 84 (6): 227-237.

Carter, D. J. 1984. Pest Lepidoptera of Europe, With Special Reference to the British Isles. Dr. W. Junk Publishers, Dordrecht, Boston and Lancaster. 431 pp.

CIE. 1965. Distribution Maps of Pests, Number 193, *Melolontha melolontha* . Commonwealth Agricultural Bureaux, UK.

CIE. 1980. Distribution Maps of Pests, Number 405, *Acrolepiopsis assectella* . Commonwealth Agricultural Bureaux, UK.

CIE. 1987. Distribution Maps of Pests, Number 490, *Agrotis segetum* . Commonwealth Agricultural Bureaux, UK.

Cindea, E. 1980. Recherches sur les moyens de lutte contre le nematode *Ditylenchus dipsaci* Kuhn. chez l'ail. Inst. Recherches Culture Plantes Maraicheres Fleurs Vidra, Romania, 9: 95-100.

CMI 1965. Descriptions of Fungi & Bacteria No. 52. *Puccinia alii* . Commonwealth Agricultural Bureaux.. 2pp.

CMI 1971. Descriptions of Fungi & Bacteria No. 298. *Urocystis cepulae* Commonwealth

sion. It may be necessary to specify the conditions [illegible]
[illegible] the quarantine status of [illegible]
[illegible] that change

REFERENCES

ert, J. [illegible] and A. W. A. El-Sharif 1982 [illegible]

[illegible] (Homoptera: [illegible] Ant [illegible])

[illegible] 1975 Pest [illegible]

[illegible] R. L. and V. [illegible] Ruetop [illegible]

n (Guide [illegible] Wiley [illegible] Sons [illegible]

Boston, [illegible] D. C. 1978

[illegible] in [illegible]

Ver [illegible] J. [illegible] 56 (5): 125 [illegible]

Hunting [illegible] in [illegible] Studies [illegible]
(6): 227-232

[illegible] 1984 [illegible] Coccoidea [illegible] With Special [illegible]

[illegible] Proc. [illegible]

tribution Maps of Pests, Number 127 [illegible]
Bureau [illegible]

[illegible] of Pests, Number 405 [illegible]

Maps of Pests, Number 433 [illegible]

[illegible] les [illegible] de [illegible]

[illegible] Culture [illegible] Vol.

[illegible] (Coccoidea) [illegible]

[illegible] Coccoidea [illegible]

Agricultural Bureaux.. 2pp.

CMI 1975. Descriptions of Fungi & Bacteria No. 456. *Peronospora destructor.* Commonwealth Agricultural Bureaux.. 2pp.

CMI 1976. Descriptions of Fungi & Bacteria No. 512. *Sclerotium cepivorum* Commonwealth Agricultural Bureaux.. 2pp.

CMI 1977. Descriptions of Fungi & Bacteria No. 553. *Erwinia chrysanthemi.* Commonwealth Agricultural Bureaux.. 2pp.

CMI 1978. Descriptions of Fungi & Bacteria No. 595. *Phytophthora porri* Commonwealth Agricultural Bureaux.. 2pp.

CMI 1977, Map 164, Ed. 3.Distribution Maps of Plant Diseases. *Sclerotinia squamosa.* Commonwealth Mycological Institute.

CMI 1984, Map 12, Ed. 5. Distribution Maps of Plant Diseases. *Urocystis cepulae* . Commonwealth Mycological Institute.

CMI 1984, Map 280, Ed. 4. Distribution Maps of Plant Diseases. *Phytophthora* cactorum. Commonwealth Mycological Institute.

CMI 1984, Map 400, Ed. 3. Distribution Maps of Plant Diseases. *Puccinia allii.*

Commonwealth Mycological Institute.

CMI 1984, Map 440, Ed. 2. Distribution Maps of Plant Diseases. *Fusarium culmorum.* Commonwealth Mycological Institute.

CMI 1985, Map 350, Ed. 5. Distribution Maps of Plant Diseases. *Alternaria porri* . Commonwealth Mycological Institute.

CMI 1986, Map 46, Ed. 5. Distribution Maps of Plant Diseases. Onion yellow dwarf virus. Commonwealth Mycological Institute.

CMI 1990, Map 76, Ed. 5. Distribution Maps of Plant Diseases. *Peronospora destructor.* Commonwealth Mycological Institute.

CMI 1990, Map 204, Ed. 4. Distribution Maps of Plant Diseases. *Phytophthora porri.* Commonwealth Mycological Institute.

CMI 1990, Map 331, Ed. 5. Distribution Maps of Plant Diseases. *Sclerotium cepivorum.* Commonwealth Mycological Institute.

7CFR (Code of Federal Regulations) 319.56. Subpart - Fruits and Vegetables.

Corbaz, R.; Bolay, A. 1991. Une pourriture de l'echalote due a *Phytophthora cactorum* .

Rev. Suisse Viticult. Arboricult. Hort. 23(4): 244-245.

CSIOS. 1987. Noi soiuri de legume recent omologate la CSIOS. Productia

Vegetala Horticultura 36 (12): 9-12.

El-Kifl, A. H., Abdel-Salem, A. L., Mansour, M. M., and G. Ghonaimy. 1975.

Biological studies on the onion maggot, *Delia alliaria* Fonseca. Bull. Soc. Entomol.

Egypte 59: 233-41.

Ellis, M.B. 1971. Dematiaceous hyphomycetes. Commonwealth Mycological Institute, England.

EPPO. 1978. *Ditylenchus destructor* Thorne Tylenchida: Anguinidae. Data Sheet on

Quarantine Organisms. 5 pp.

EPPO. 1980. *Erwinia chrysanthemi* Burkholder, McFadden & Dinock. Data Sheet on

Quarantine Organisms. 5 pp.

EPPO Database. 1994-95. European and Mediterranean Plant Protection

Organization, Plant Quarantine Retrieval System, ver. 2.0.

FAO Database. 1994. Global Plant Quarantine Information System.

FAO. 1995. International Standards For Phytosanitary Measures. Section 1 - Import

Regulations. Guidelines For Pest Risk Analysis (Draft Standard). Secretariate of the International Plant Protection Convention of the Food and Agriculture Organization of the United Nations. Rome, Italy.

Farr, D. F., G. F. Bills, G. P. Chamuris, and A. Y. Rossman. 1989. Fungi on Plants and Plant Products in the United States. Amer. Phytopathol. Soc., St. Paul, Minn.

1252 pp.

French, A. M. 1989. California Plant Disease Host Index. Calif. Dept. Food Agric.,

Sacramento, CA. 394 pp.

Freuler, J, Raymond,J.C., Antonin, P., Fischer, S.and C. Rey. 1980. La mouche

mineuse de l'oignon, Liriomyza nietzkei Spencer (Dipt.,Agromyzidae).

Observations sur la colonisation de l'oignon de semis et mise au point d'un seuil

economique de traitement. Rev. Suisse Viticult. Arboricult. Horticult. 12: 133-140.

Government Agricultural Research Centre, Ghent, Belgium. Control of root rot (*Fusarium culmorum*) and leaf rust (*Puccinia allii*) pp. 175-190. In Conference Title: Belgium, Government Agricultural Research Centre, Ghent: Activity Report 1975.

Gunn, C.R. and C. Ritchie. 1982. 1982 Report of the Technical Committee to Evaluate Noxious Weeds; Exotic Weeds for Federal Noxious Weed Act. (Unpublished).

Havens, O. 1986. Plant Pests of Phytosanitary and Regulatory Significance to Importing Countries and States, Fifth Edition. Calif. Dept. Food Agric., Sacramento, CA. 152 pp.

Heymans, P., F. Liekens. 1973. Bestrijding van schimmels en onkruiden in de preiteelt. Tuinbouwberichten 36 (7): 287-290.

Hill, D. S. 1987. Agricultural Insect Pests of Temperate Regions and Their Control. Cambridge Univ. Press, Cambridge. 659 pp.

Holm, L.G., D. L. Plucknett, J.V. Pancho and J.P. Herberger. 1977. The World's Worst Weeds. University of Hawaii Press, Honolulu. 609 PP.

Holm, L.G., J. V. Pancho and J.P. Herberger and D. L. Plucknett. 1979. A Geographical Atlas of World Weeds. John Wiley and Sons, New York. 391 pp.

Hunt, N.R., A.L. Lohr. 1944. Foreign Diseases of Allium. USDA, unpublished. 15 pp.

INKTO. Insects Not Known to Occur in the United States. A Chafer (*Melolontha melolontha* (L.)).

Instituut voor Plantenziektenkundig Onderzoek, Netherlands. 1972. Jaarverslag 1971 (Annual report for 1971 of the Institute for Research on Plant Diseases). 190 pp.

Kaai, C., J. L. Koert. 1971. Control of stem nematodes on onions with Phytosol. Pflanzenschutz Nachrichten Bayer 24 (3): 525-535.

Kohl, J., W. M. Molhoek, N. J. Fokkema. 1991. Biological control of onion neck rot (*Botrytis aclada*): protection of wounds made by leaf topping. Biocontrol Sci.

Technol. 1 (4): 261-269.

Kohl, J., W. M. L. Molhoek, C. H. van der Plas, N. J. Fokkema. 1995. Suppression of sporulation of *Botrytis* spp. as a valid biocontrol strategy. European J. Plant Pathol. 101 (3): 251-259.

Krijthe, J. M. (Ed.). 1973. Annual report 1972, Institute for Phytopathological Research. pp.18-27. Wageningen., Netherlands.

Maas, J. L. (Ed.). 1984. Compendium of Strawberry Diseases. Amer. Phytopathol. Soc., St. Paul, Minn. 138 pp.

Martinez, M. 1982. Contribution a l'etude des Agromyzidae de France (Dipt.) (2e note). Bull. Sc. Entomol Fr. 87: 302-308.

NAPPO./FAO. 1995. NAPPO/FAO Glossary of Phytosanitary Terms. North American Plant Protection Organization (NAPPO) and United Nations Food and Agriculture Organization (FAO). NAPPO Secretariate, Ottawa, Ontario, Canada.

Neury, G., and R. Corbaz. 1990. La cladosporiose de l'oignon, une mycose nouvellement apparue en Suisse. Rev. Suisse Viticult. Arboricult. Horticult. 22(2): 87-90.

PNKTO No.5. Pests Not Known to Occur in the United States or of Limited Distribution No. 5: *Agriotes lineatus* , lined click beetle. USDA. 4 pp.

PNKTO No. 47. Pests Not Known to Occur in the United States or of Limited Distribution No. 47: Large White Butterfly. USDA. 11pp.

PNKTO No. 74. Pests Not Known to Occur in the United States or of Limited Distribution: Cabbage Moth. 15pp.

PNKTO No. 75. Pests Not Known to Occur in the United States or of Limited Distribution: Silver-Y Moth. 16pp.

Reed, C. F. 1977. Economically Important Foreign Weeds. Agriculture Handbook No. 498, 746 pp.

Roelands, C., W. Alofs. 1979. Is bestrijding van *Fusarium culmorum* in prei mogelijk? Groenten en Fruit 34 (47): 58-59.

Schepers, H. T. A. M., R. Meier. 1992. Schimmelziekten in prei. Akkerbouw en de

Groenteteelt in de Vollegrond 13: 13-19.

Schwartz, H. F., and S. K. Mohan (Eds.). 1995. Compendium of Onion and Garlic Diseases. Amer. Phytopathol. Soc., St. Paul, Minn. 54 pp.

Smith, I. M., McNamara, D. G., Scott, P. R. and K.. M. Harris. [eds.]. 1992.

Quarantine Pests for Europe. Data Sheets on Quarantine Pests for the European

Communities and for the European and Mediterranean Plant Protection

Organization. CABI International, University Press, Cambridge. 1032 pp.

Spencer, K. A. 1973. Agromyzidae (Diptera) of Economic Importance. Dr. W.

Junk B. V., Publishers, The Hague. 418 pp.

---. 1990. Host specialization in the World Agromyzidae (Diptera). Kluwer

Academic Publishers, Dordrecht, Boston, London. 444 pp.

Suss, L. 1974. *Liriomyza nietzkei* Spencer (Diptera, Agromyzidae) dannosa alle

cultivazioni di cipolla *(Allium cepa*) in Italia. Boll. Zool. Agraria Bachicoltura

12: 205-9.

United States Department of Agriculture, National Agricultural Pest Information System Database (NAPIS).

USDA. 1995. Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments, ver. 4.0. PPQ, APHIS 15pp.

Vallotton, R. 1981. Les nematodes nuisibles aux cultures maraicheres en Suisse

romande et au Tessin. Rev. Suisse Viticult. Arboricult. Horticult. 13(4): 229-235.

Van Dijk, 1993. Survey and characterization of potyviruses and their strains of *Allium* species. Netherlands J. Plant Pathol. 99 (Suppl. 2): 1-48.

van Frankenhuyzen, A. 1977. Uiemineervlieg, een minder bekende aantaster van

uien en prei in Nederland. Gewasbescherming 8: 59-65.

Vanparys, L., Seynnaeve, M. and A. Calus. 1993. Prei. Overzicht van het onderzoek

1990. Belgium, Provinciaal Onderzoek-en Voorlichtingscentrum voor Land-en

Tuinbouw, Beitem-Roeselare 187 pp.

Verhoyen, M., F. Horvat. 1973. La 'striure chlorotique du poireau'. I. Identification de l'agent causal. Parasitica 29 (1): 16-28.

---. 1981. Identification of shallot (*Allium ascalonicum* L.) viruses in Belgium. Parasitica 37(2): 79-86.

Watson, A. J. 1971. Foreign Bacterial and Fungus Diseases of Food, Forage, and Fiber Crops: An Annotated List. U.S.D.A. Agriculture Handbook No. 418. 111pp.

WSSA. 1989. Composite List of Weeds. Weed Science Society of America.

Zhang, B.G. 1994. Index of Economically Important Lepidoptera. CAB International, Wallingford. 599pp.